DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
WASHINGTON, D.C. 20380

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1 FEB 1983

From: Commandant of the Marine Corps
To: Distribution List

Subj: Required Operational Capability (ROC) No. LOG 1.51 for an Electronics Maintenance Complex (EMC)

Ref: (a) MCO 3900.4B

Encl: (1) ROC No. LOG 1.51 for an Electronics Maintenance Complex (EMC)

1. This letter establishes and promulgates ROC No. LOG 1.51 for an Electronics Maintenance Complex (EMC). The ROC has been developed in accordance with the reference and is contained in the enclosure.

2. The Commanding General, Marine Corps Development and Education Command (Director, Development Center) is the Marine Corps point of contact for the development efforts pertaining to the EMC.

Eugene B. Russell

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REQUIRED OPERATIONAL CAPABILITY (ROC) NO. LOG 1.51
FOR AN
ELECTRONICS MAINTENANCE COMPLEX (EMC)

1. STATEMENT OF REQUIREMENT. A major logistical consideration in the area of combat service support is the availability of adequate facilities for maintenance of electronics systems and components. Facilities are required which provide space, internal appointments, environmental conditioning, and protection for the complete range of activities required for responsive and efficient electronics maintenance. The facilities require flexibility of configuration to meet both current and projected needs, simplicity of design to reduce production cost, and commonality with other programs to make use of currently available Marine Corps equipment. An Initial Operational Capability (IOC) is required during FY 1986.

2. THREAT AND OPERATIONAL DEFICIENCY

a. Threat. Potential enemy threats confronting the United States in the near- to long-range period are described by the Marine Corps Long Range Plan (MLRP), the Marine Corps Midrange Objectives Plan (MMROP) and General Operational Requirement (GOR) LOG-1. To successfully counter predicted threats, the Marine Corps must be capable of rapid response organized and tailored to general or specific mission needs. The success of combat operations at any level of intensity is directly dependent upon the degree of efficiency and effectiveness of the operational logistic support provided. The ability to communicate, maneuver, and coordinate/direct fires can only be assured if the sophisticated weapons and equipment employed by the Fleet Marine Forces receive timely and efficient maintenance support.

b. Operational Deficiency. The current inventory of electronics maintenance shelters will require replacement due to age and obsolescence in the mid-1980s.

(1) Age. The current inventory of electronics maintenance shelters is comprised of six different families: the AN/GRM-32, -38, -82, -94, -98 and AN/TSM-3. The earliest model of these shelters, the AN/GRM-32, was first fielded in 1959 and is becoming progressively more difficult and less economical to repair. It is anticipated that by the mid-1980s the current inventory will be reduced by normal use atttrition to the point where complete inventory replacement will be required.

(2) Obsolescence. Although the need for environmentally controlled, tactical electronics maintenance facilities has long been recognized, the nature and criticality of that need has undergone significant change. The current inventory was developed

and fielded to provide facilities for a very specific range of equipment. The AN/GRM-32 family was designed to support the radio set AN/TRC-75; the AN/GRM-38 family was designed to support the radio set AN/TRC-27; and the AN/GRM-98 family was tailored to support test and repair on the current family of UHF radios (AN/GRC-112, -134A, and -135). While the AN/GRM-82 and AN/GRM-94 families are not restricted to use on a specific group or type of equipment, they are limited to supporting only test and repair maintenance functions. The AN/TSM-3 was designed to provide support for Model 28 teletype and tactical teletype systems. The number, diversity, and combat essentiality of the current and projected inventory of electronics systems creates a much greater demand for electronics maintenance shelters. Additionally, the cost, complexity, and need for flexibility associated with current and future electronics maintenance dictates a new, systematic approach to tactical electronics maintenance.

3. OPERATIONAL AND ORGANIZATIONAL CONCEPTS

a. Operational Concepts. The Electronics Maintenance Complex (EMC) will be comprised of a standard suite of Marine Corps Expeditionary Shelter System (MCESS) shelters and internal appointments/furnishing modules (minus any active electronic test equipment) which will be used at intermediate level (3d and 4th echelon) maintenance activities. A complete range of internal appointment models will be developed to enable the user to configure each shelter to meet immediate mission needs. In addition, the shelters will be capable of being joined together or complexed by the user to permit phased expansion or reduction of an electronics maintenance facility.

(1) Functions. The intermediate level maintenance functions performed in the EMC will include the following:

(a) Test and fault isolation of electronic systems and components.

(b) Repair of electronic systems and components.

(c) Maintenance and management of a technical reference library.

(d) Shipping and receiving of equipment within the maintenance cycle, i.e., repair parts and maintenance support equipment.

(e) Organic and customer equipment storage.

(f) Maintenance management and administration.

(2) Commodities. Commodities which will be maintained in the EMC will include, at a minimum, the following:

(a) Radio.

(b) Teletype.

(c) Telephone.

(d) Communications security (limited).

(e) Message and circuit switching.

(F) Radar.

(g) Tactical data and command/control.

(h) Test, measurement and diagnostic.

(i) Laser.

(j) Test/repair small missile systems.

b. Organizational Concepts. The EMC will be designed and developed in a manner which permits the complex, or any of its individual shelters, to be used in both garrison and field environments. The EMC design will also permit the using organization to configure individual shelters to support the mission of the organization in its role as a traditional element of a Marine Aircraft Wing, Division, FSSG, or as a task organized unit of a Marine Air-Ground Task Force (MAGTF).

(1) Traditional Organizations. The EMC will be used by the following Marine Corps organizations:

(a) Force Service Support Group.

1 Electronics Maintenance Company.

2 General Support Maintenance Company.

3 Communications Company.

(b) Communications Battalion.

(c) Radio Battalion.

(d) Communications Company, Marine Division.

(e) Marine Wing Headquarters Squadron.

(f) Marine Wing Communications Squadron.

(g) Headquarters and Headquarters Squadron, Marine Air Control Group.

(h) Marine Air Control Squadron.

(i) Marine Air Support Squadron.

(j) Light Anti-aircraft Missile Battalion.

(k) Headquarters Battery, Artillery Regiment.

(2) Task Organizations. The EMC will be capable of being reconfigured by any of the above organizations to provide a tailored electronics maintenance facility to support the operations of any of the supporting elements of a MAGTF as well as to provide short term contact team maintenance support.

c. Inventory Objective. It is estimated that a total of 636 MCESS shelters will be required to configure a total of 42 EMCs for the Fleet Marine Forces (Active and Reserve).

d. Special Logistic and Training Support Considerations

(1) Logistics. Logistic considerations will play a major role in the development of the EMC. Since an EMC will consist of one or more MCESS shelters outfitted with standards and internal appointment modules (IAMs) and will be used in lieu of current outmoded shelters, proper planning during the course of the development cycle will minimize the logistic impact and prevent proliferation of shelters. Further, since it is recognized that a potential logistic burden could be posed in terms of mobilty, electric power, environmental control, and material handling, the following factors will influence and/or constrain the program throughout its development and fielding phases:

(a) Availability of transportation.

(b) Availability of prime power and environmental control systems.

(c) Availability of material handling equipment suitable for loading and unloading shelters and assembling complexes.

(d) Simplicity of assembly, disassembly, and reconfiguration of shelters for different functions. This includes the requirement that in any configuration or mode (operation/transport), adequate controls are enforced over such factors as shelter stress loading and center of gravity.

(2) Training Support. Since the design efforts for the EMC include shelter requirements and IAMs, but not the active electronic equipment, no special training requirements are anticipated at this time. Training in the assembly/disassembly of MCESS shelters is ongoing during the introduction of that system. Training in reconfiguration of shelters and complexes must be evaluated during IOT&E.

4. ESSENTIAL CHARACTERISTICS

a. Operability

(1) Garrison. The EMC must be capable of providing the full range of facility support discussed in paragraph 3 above, without disruption of service or function for a minimum of eight hours per day, five days a week, thoughout the service life of the system, excluding disruptions of service caused by inadvertent or accidental damage not incurred as a result of normal operations.

(2) Field. The EMC must be capable of sustained operation a minimum of 20 hours per day for a 90-day period without disruption of service or function, excluding disruptions of service caused by inadvertent or accidental damages not incurred as a result of normal handling or operation.

b. Compatibility. The shelters, joining corridors, assembly/transport kits, and pallets will be fully compatible with the standards, specifications, and practices associated with and dictated by MCESS. Modifications to the shelters and other items listed above which may be required to integrate standard appointment modules and other internal appointments will not impinge on or detract from this compatibility. EMI shielding has been incorporated into the design of the 8'x 8 x 10' and 8'x 8'x 20' MCESS EMI shelters. The EMC design shall maintain the same level of protection as the MCESS EMI shelters.

c. Reliability, Availability, and Maintainability

(1) Reliability

(a) Power and Lighting Subsystem. The reliability of the subsystem must be shown by analysis to exceed a mean-time-between-failure (MTBF) of 20,500 hours. This MTBF will result in a 90% probability of no operational failures occuring during continuous operation of the subsystem over a 90-day period.

(b) Structure and Furnishings. Reliability will be established through stress analysis and environmental testing. Any failure during testing will be considered a basis for rejection of the item and cause for correction of the design and/or manufacturing process.

(c) Test Instrumentation. Reliability factors will not be established since the test equipment is not a component part of the EMC.

(2) Availability

(a) Inherent Availability. The inherent availability of the EMC cannot be determined because it is a function of the

reliability and maintainability characteristics stated herein.

(b) Operational Availability. An operational availability of 83% will be acceptable for sustained (90-day) field operations. An operational availability of 83% for garrison operation will be minimally acceptable. Refer to paragraph 4a.

(3) Maintainability. A maximum repair time of four hours (at a 90% level of confidence) will be acceptable for the entire system.

(a) Furnishings. A mean-time-to-repair (MTTR) of two hours will be acceptable. This refers to repairs of the failed item with it in place, or with it removed for maintenance and successfully reinstalled. Repair by replacement-in-kind within a two-hour limit will not constitute acceptable maintainability.

(b) Basic Structure. A MTTR of three hours will be acceptable. These repairs will consist of patching the outer or inner skin of the shelter to repair puncture-type damage.

(c) Power and Lighting. A MTTR of one hour will be acceptable for all repairs excluding the replacement of light bulbs for which a MTTR of .1 hour will be acceptable.

d. Nuclear, Biological & Chemical (NBC) Survivability. A statement regarding EMC NBC survivability and susceptability to electromagnetic pulse (EMP) is inappropriate since this characteristic is defined by, and is a function of, the MCESS program. It is necessary that the EMC be capable of continuous operation in an environment which has been contaminated by an NBC attack. This capability, however, will be primarily driven by personnel precautions and/or protective measures which are extraneous to the EMC design.

e. Utility. This characteristic addresses the degree of facility with which the EMC can be assembled, reconfigured, disassembled, and packed for transport.

(1) The shelters and IAMs will be capable of being reconfigured by a team of four totally untrained personnel in a period of four hours when using appropriate written instructions and drawings. This implies that a totally assembled and operational shelter in one functional configuration can be transformed to perform a different function by the removal of the IAMs and the rearrangement or replacement of them with a different set of modules.

(2) A complex of EMC shelters will be capable of being emplaced and joined together on an adequate site in a period of eight hours by a team of four totally untrained personnel for each group of four shelters.

f. Interoperability

(1) Power. EMC shelters will be capable of operation on either 60Hz or 400Hz prime power, with the added capability of distributing a separate, alternate or auxiliary power source with the requisite capability to support the maintenance of the equipment listed in par 3a(2) throughout the shelter.

(2) Communication. EMC shelters will provide for, and be be compatible with, standard tactical telecommunications equipment (telephones and switchboards). The capability for both intra-EMC communications and communications with external activities will be included.

(3) Other Signal. The EMC will accommodate adequate entry and egress of radio frequency signals, and the routing of signals from position to position.

5. OTHER WARFARE AREAS CONCERNED. The development of this system will primarily affect Mission Area-216.4 (Combat Service Support-Shelters) and will have applicability in Military Operations in Urban Terrain (MOUT).

6. RELATED EFFORT. Marine Corps Expeditionary Shelter System (MCESS) ROC NO. LOG-1.20, dated 20Aug77.

7. TECHNICAL FEASIBILITY, ENERGY-EFFECTIVENESS IMPACT, AND COST FORECAST

a. Technical feasibility. The development of an EMC is technologically feasibile by using the basic shelters developed under the MCESS program, and lightweight, economically produced commercially available appointments (furnishings). The Depot Maintenance Activity, Marine Corps Logistics Base, Albany, GA., as well as industry, has the capacity, capability, and requisite experience for this type effort.

b. Energy-Effectiveness Impact. An accurate assessment of energy effectiveness is not possible at this time; however, if the EMC is equipped with modern electronics and test equipment, the power draw will be very low. The need for environmental control will be evaluated based on TMDE requirements on a shelter-by-shelter basis. Current Marine Corps standard environmental control units (ECUs) will be used as required. Since the EMC program in no way modifies the structural design of MCESS shelters, energy-effectiveness is a function of the test equipment used to support the mission for which the shelter has been tasked configured. Further, since this equipment is not a part of the EMC program, but of related programs, the requirement for energy conservation will be met by the introduction of new, energy efficient test equipment to replace currently available equipment.

c. Cost Estimate. It is estimated that the EMC project will require 636 shelters from the MESS program over a 5 year period. Funds will be programmed under the MCESS program. The cost for internal appointments/furnishing modules for the estimated 636 shelters is approximately $1,900,000.00 over a 5 year period. The majority of the O&M,MC costs for the ECM program is a function of and will be devoted to maintenance of the electronic equipment housed in the shelters.